AMENDMENTS TO THE CLAIMS

1. (Previously Presented) Method for introducing information into a data stream including data about spectral values representing a short-term spectrum of an audio signal, including:

processing the data stream to obtain the spectral values of the short-term spectrum of the audio signal;

combining the information with a spread sequence to obtain a spread information signal, wherein the information includes information bits, and wherein the combining includes spreading the bits based on a spread spectrum modulation by combining the bits with the spread sequence;

generating a spectral representation of the spread information signal to obtain a spectral spread information signal;

establishing a psychoacoustic maskable noise energy as function of frequency for the short-term spectrum of the audio signal, wherein the psychoacoustic maskable noise energy is smaller or the same as the psychoacoustic masking threshold of the short-term spectrum;

weighting the spectral spread information signal by using the established noise energy to generate a weighted information signal, wherein the energy of the introduced information is substantially equal to or below the psychoacoustic masking threshold;

summing the weighted information signal with the spectral values of the short-term spectrum of the audio signal to obtain sum spectral values including the short-term spectrum of the audio signal and the information; and

processing the sum spectral values to obtain a processed data stream including the data about the spectral values of the short-term spectrum of the audio signal and the information to be introduced.

2. (Original) Method according to claim 1, wherein the data stream comprises quantized spectral values as data about spectral values, the step of processing of the data stream including the following sub-step:

inverse quantizing the quantized spectral values to obtain the spectral values; and

the step of processing the summed spectral values including:

quantizing the sum spectral values to obtain quantized sub-spectral values; and

forming the processed data stream using the quantized sum spectral values.

3. (Original) Method according to claim 2 wherein the quantized spectral values in the data stream are entropy encoded, the step of processing the data stream including the following sub-step:

entropy-decoding the entropy-encoded spectral values to obtain the quantized spectral values; and

the step of processing the sum spectral values including:

entropy-encoding the quantized sum spectral values.

4. (Original) Method according to claim 1, wherein the step of establishing the psychoacoustic maskable noise energy comprises:

computing the psychoacoustic masking threshold as function of frequency using a psychoacoustic model, which is based on the spectral values of the audio signal.

5. (Original) Method according to claim 1, wherein a masking threshold used in generating the data stream as function of frequency for the short-term spectrum is present in the data stream as side information, the step of establishing including:

extracting the psychoacoustic masking threshold from the data stream, wherein the psychoacoustic maskable noise energy is the same as the psychoacoustic masking threshold.

6. (Original) Method according to claim 1, wherein the data stream further comprises side information including scale factors by which the spectral values will be multiplied in groups in an audio encoder prior to quantizing, the step of processing the data stream further including the following sub-step:

extracting the scale factors from the data stream; and

the step of establishing including:

computing the noise energy introduced into the audio encoder when quantizing as function of frequency by using the scale factors for the short-term spectrum and by using the spectral values as well as knowing a quantizer used in the audio encoder, the introduced noise energy being a measure for the psychoacoustic maskable noise energy used in weighting.

7. (Original) Method according to claim 6, wherein the data stream is formed according to ISO/IEC 13818-7 (MPEG-2 AAC) and the step of estimating the noise energy comprises:

establishing a quantizing step for the spectral values from a scale factor band using the scale factor associated with this scale factor band;

evaluating the following formula to obtain the noise energy for the scale factor band introduced by quantizing,

$$x\,min = \sum_{i} [(2^{3/8 \cdot QS}) / (27/4) \cdot x_i^{1/2}]$$

wherein x_i is the i-th spectral line in a scale factor band, QS is the quantizing step for this scale factor band and xmin is the noise energy introduced in the scale factor band by quantizing;

the step of weighting including:

setting the spectral values of the spectral representation of the spread information signal in the scale factor band such that the total energy of the set spectral values is the same as the noise energy in this scale factor band obtained in the step of evaluating.

8. (Original) Method according to claim 1, wherein the spectral values of the data stream are quantized such that the noise energy introduced by quantizing is smaller than the psychoacoustic masking threshold by a predetermined amount and wherein, in the step of establishing an energy corresponding to the predetermined amount is established; and

wherein in the step of weighting the spectral values of the spectral representation of the spread information signal are set such that they have an energy corresponding to the predetermined amount.

9. (Previously Presented) Method according to claim 8, wherein the value of the predetermined amount is present as side information in the data stream, in the step of establishing the value for the predetermined amount will be extracted from the side information of the data stream.

10. (Original) Method according to claim 1, wherein in the step of processing the sum spectral values, the same quantizing step sizes as in the original data stream are used.

11. (Withdrawn) Method for encoding an audio signal including:

generating a short-term spectrum of the audio signal including a plurality of spectral values;

computing the psychoacoustic masking threshold of the audio signal using a psychoacoustic model;

quantizing the spectral values considering the psychoacoustic masking threshold so that the noise energy introduced by quantizing is smaller than the psychoacoustic masking threshold by a predetermined amount;

forming a bit stream including values corresponding to the quantized spectral values of the short-term spectrum and including an indication for the value of the predetermined amount.

12. (Cancelled)

13. (Previously Presented) Apparatus for introducing information into a data stream including data about spectral values representing a short-term spectrum of an audio signal, including:

a processor for processing the data stream to obtain the spectral values of the short-term spectrum of the audio signal;

a combiner for combining the information with a spread sequence to obtain a spread information signal, wherein the information includes information bits, and wherein the combiner is operative to spread the bits based on a spread spectrum modulation by combining the bits with the spread sequence;

a generator for generating a spectral representation of the spread information signal to obtain a spectral spread information signal;

an establisher for establishing a psychoacoustic maskable noise energy as function of the frequency for the short-term spectrum of the audio signal, wherein the psychoacoustic maskable noise energy is smaller than or equal to the psychoacoustic masking threshold of the short-term spectrum;

a weighter for weighting the spectral spread information signal by using the established noise energy to generate a weighted information signal, wherein the energy of the introduced information is substantially equal to or below the psychoacoustic masking threshold;

a summer for summing the weighted information signal with the spectral values of the short-term spectrum of the audio signal to obtain spectral values including the short-term spectrum of the audio signal and the information; and

another processor for processing the sum spectral values to obtain a processed data stream including the data about the spectral values of the short-term spectrum of the audio signal and the information to be introduced.

14. (Withdrawn) Apparatus for encoding an audio signal, including:

a generator for generating a short-term spectrum of the audio signal including a plurality of spectral values;

a calculator for computing a psychoacoustic masking threshold of the audio signal using a psychoacoustic model;

a quantizer for quantizing spectral values considering the psychoacoustic masking threshold so that the noise energy introduced by quantizing is smaller than the psychoacoustic masking threshold by a predetermined amount;

a bitstream formatter for forming a bit stream including values corresponding to the quantized spectral values of the short-term spectrum and including an indication for the value of the predetermined amount.

15. (Previously Presented) Method of claim 1, in which the spread sequence | used in the step of combining is a pseudo noise spread sequence.

16. (Previously Presented) Method of claim 1, in which the step of combining is conducted so that for an information bit with a first logic level, the spread sequence is included unchanged into the spread information signal, and so that for an information bit with a second logic level, an inverse spread sequence is included into the spread information signal.